

BASRAH INTERNATIONAL AIRPORT –  
TERMINAL AND TOWER  
RENOVATION  
BASRAH, IRAQ

**PROJECT NUMBER SIGIR-PA-06-049**

**JULY 24, 2006**

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## **SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION**

July 24, 2006

MEMORANDUM FOR COMMANDING GENERAL, MULTI-NATIONAL FORCES -  
IRAQ  
COMMANDING GENERAL, GULF REGION DIVISION,  
U.S. ARMY CORPS OF ENGINEERS  
DIRECTOR, IRAQ RECONSTRUCTION MANAGEMENT  
OFFICE

SUBJECT: Report on Project Assessment of the Basrah International Airport Terminal  
Tower Renovation, Basrah, Iraq (Report Number SIGIR-PA-06-049)

We are providing this project assessment report for your information and use. We assessed the in-process construction work being performed for the Basrah International Airport Terminal and Tower Renovation, Basrah, Iraq, to determine its status and whether intended objectives will be achieved. This assessment was made to provide you and other interested parties with real-time information on a relief and reconstruction project underway and in order to enable appropriate action to be taken, if warranted. The assessment team included a professional engineer and an auditor.

The comments received from the Commander, Gulf Region Division, U.S. Army Corps of Engineers, and the Director, Iraq Reconstruction Management Office, in response to a draft of this report addressed the issues raised and the actions taken should correct the issues we identified. As a result, comments on this final report are not required.

We appreciate the courtesies extended to our staff. This letter does not require a formal response. If you have any questions please contact Mr. Brian Flynn at (703) 604-0969 or [brian.flynn@sigir.mil](mailto:brian.flynn@sigir.mil) or Mr. Andrew Griffith, P.E., at (703) 343-9149 or [andrew.griffith@iraq.centcom.mil](mailto:andrew.griffith@iraq.centcom.mil).

Stuart W. Bowen, Jr.  
Inspector General

# Special Inspector General for Iraq Reconstruction

SIGIR-PA-06-049

July 24 2006

## Basrah International Airport – Terminal and Tower Renovation, Basrah, Iraq

### Synopsis

**Introduction.** This project assessment was initiated as part of our continuing assessments of selected sector reconstruction activities for Public Works and Water. The overall objectives were to determine whether selected sector reconstruction contractors were complying with the terms of their contracts or task orders and to evaluate the effectiveness of the monitoring and controls exercised by administrative quality assurance and contract officers. We conducted this project assessment in accordance with the Quality Standards for Inspections issued by the President’s Council on Integrity and Efficiency. The assessment team included a professional engineer and an auditor.

**Project Assessment Objectives.** The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results were consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design;
4. The Contractor’s Quality Control plan and the United States Government’s Quality Assurance program were adequate; and
5. Project sustainability was addressed.

**Conclusions.** The assessment determined that:

1. The stated objective of the Basrah Terminal Renovation Project was “*the renovation and repairs will bring these facilities up to an acceptable level of comfort, safety, and functionality.*” Renovation locations included the air traffic control tower, airport terminals, plant facility, fire station, and their supporting facilities.

Although the individual tasks of the project appear to be complete, the objective of this project has not been achieved. The water treatment facility, which generates the required processed water for the HVAC systems, as well as the potable water supply for the airport, was not operational at the time of the assessment. Although United States Army Corps of Engineers documentation identified that “*poor quality processed water places \$2.5 million of chiller work in jeopardy*” in a 10 April 2005 Airport Status Meeting presentation, there are no budgeted projects to repair the water treatment facility that existed at the time of the assessment.

2. This project was primarily renovation of facilities and did not include any new construction. The contract did not require design submittals, although repair, renovation, and rehabilitation plans were required. The contractor submitted potable water, sanitary sewer, architectural, mechanical, and heating, ventilation and air conditioning work plans to the United States Army Corps of Engineers,

Gulf Region South. The United States Army Corps of Engineers, Gulf Region South completed a technical review and commented on the contractor's work plans. The contractor re-submitted revised work plans. The work plans appeared adequate to complete the required renovation work. This occurred because the United States Army Corps of Engineers reviewed, commented, and approved the plans, thus ensuring they were consistent with contract requirements.

3. All work observed appeared to be consistent with the contract requirements. This occurred in part because the United States Army Corps of Engineers Resident Engineer and the United States Army Corps of Engineers Quality Assurance Representative effectively monitored and supervised the renovation efforts of the contractor. The United States Army Corps of Engineers offices were located adjacent to the airport facility. The United States Army Corps of Engineers Quality Assurance Representative was at the project site daily, which was instrumental in managing this large and varied project.
4. The contractor submitted a quality management plan that contained the required organization chart, security plan, safety plan, and quality control (QC) plan. We determined that the contractor's quality management plan met the standards addressed in Engineering Regulation 1180-1-6 (*Construction Quality Management*) or PCO Standard Operating Procedure CN-103 (*Contractor Construction Quality Control Plan*). The contractor submitted daily QC reports, which contained information such as work accomplished each day with the location, activity and by whom, test results, deficiencies and corrective actions, labor distribution, equipment utilized, and material received on site. The contractor did not maintain deficiency logs to document problems noted with construction/renovation activities.

The USACE Engineering Regulation (ER) 1110-1-12 and PCO Standard Operating Procedure CN-100 specify requirements for a Government Quality Assurance program. Overall, the QA program was adequate. The QAR was on site on a regular basis during construction, monitored field activities, and submitted QA reports. A deficiency log was not maintained, but deficiencies were minimal. In addition, the QA reports included detailed photographs.

5. Sustainability was addressed. The contract specifications required the contractor to provide and certify warranties in the name of the airport authority for all equipment which includes any mechanical, electrical and/or electronic devices, and all operations for 12 months after issuance of the Taking-Over-Certificate. The contract required the contractor to provide training to the Iraqi workforce on the operations and maintenance of all infrastructure communication components.

**Recommendations.** The Commanding General of the Gulf Region Division/Project and Contracting Office and the Iraq Reconstruction Management Office should coordinate on other Basrah International Airport renovation projects. In addition, the Commanding General of the Gulf Region Division/Project and Contracting Office and the Iraq Reconstruction Management Office should require:

A comprehensive and coordinated effort to include scope and funding requirements and funding requests to ensure that the Basrah International Airport has a functioning water treatment facility to provide potable water for the passenger terminal and to provide processed water, which is required for the heating, ventilation, and air conditioning systems, if the original objectives of the contract are still valid.

**Management Comments.** The Commander, Gulf Region Division (GRD), of the U.S. Army Corps of Engineers and the Director, Iraq Reconstruction Management Office (IRMO) provided comments to the draft report. The Commander GRD did not concur with the recommendation, although he agrees with the intent of the recommendation and recommended that it should be directed to (IRMO). IRMO agreed that a properly operating water treatment plant is required to support equipment repairs and make the buildings habitable at Basrah International Airport (restroom, HVAC, water and health). IRMO stated that a detailed solicitation to repair the Water Treatment Plant was completed, although funding is currently not available. Additionally, water plant repairs are an IRMO Transportation priority in FY2007, if funding becomes available. IRMO noted that this issue is quite critical as the use of untreated water in the chillers will damage sensitive equipment.

**Evaluation of Management Comments.** The management comments addressed the issues raised in our report and the actions taken and planned should correct the issues identified, pending funding of the repair of the Basrah Airport water treatment project.

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# Introduction

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## Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results were consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design;
4. The Contractor's Quality Control (CQC) plan and the United States Government's Quality Assurance (QA) program were adequate; and
5. Sustainability was addressed.

## Pre-Site Assessment Background

### Contract, Task Order, and Costs

The Basrah Airport Tower and Terminal project was completed under Contract W914NS-04-D-0101, dated 31 March 2004, Task Order (TO) 0025, a firm-fixed price, indefinite delivery/indefinite quantity design contract to support the Ministries of Transportation and Communication in the Port of Um Qasr, Iraq, for \$4,921,318. The contract was between the Project Management Office and NANA Pacific, Anchorage, Alaska. Contract W914NS-04-D-0101 called for a variety of minor repair, modification, rehabilitation, alterations, and new construction in and around the existing Port of Um Qasr, Iraq. There were zero modifications to the initial contract.

TO 0025, dated 11 November 2004, was a firm-fixed price, indefinite delivery/indefinite quantity design contract. The Basrah airport terminal, air traffic control (ATC) tower, fire station, and the supporting facilities are below the standards necessary to provide a safe and healthy environment for the traveling public and airport operation personnel. The Basrah Airport tower and terminal task order total value is \$4,921,318.00, which is separated into the following three phases:

- Phase 1 was for \$1,997,648.00. Phase 1 covered the general repairs and renovation of Basrah airport terminal, air traffic control (ATC) tower, fire station, power plant, and road access.
- Phase 2 was for \$930,750.00. Phase 2 covered the renovation of the Basrah airport terminal, ATC tower, fire station, administration, and power plant.
- Phase 3 was for \$1,992,920.00. Phase 3 covered the renovation of the Basrah airport terminal facility, fire station, administration, and power plant.

TO 0025 currently contains six modifications.

- Modification # 0001, dated 1 April 2005, reduced, adjusted, corrected, increased, deleted, accepted, and added various scopes of work requirements to the contract. The modification included some changes in contract



specifications. There was no change in the total contract value; however, the contract completion date was extended by 21 calendar days.

- Modification #P00002, dated 30 April 2005, deleted non-essential renovation work and increased the funding by \$57,680 from \$4,921,318 to \$4,978,988. In addition, the modification deleted or reduced quantities of nine line items in the original contract. The modification added four tasks with a not to exceed of \$249,920.00. The rest of the contract's terms and conditions remain unchanged.
- Modification # P00003, dated 15 May 2005, decreased the funding requirement by \$10.00 from \$57,680.00 to \$57,670.00. The contract funding requirement will increase from \$4,921,318 to \$4,978,988.
- Modification # P00004, dated 30 August 2005, incorporated five changes. The first change was that the government will reimburse the contractor \$39,187.88, authorized by the Administrative Contracting Officer Gulf Region South, for the temporary living arrangements for its subcontract. The second change, authorized by the Administrative Contracting Officer Gulf Region South, was to replace 278 valves in the terminal building for \$26,812.42. The third change deleted item T-1 Outgoing Baggage repairs for the Basrah terminal, and no additional funding was approved. The fourth change de-obligated \$44,280 from the T-16 general wall repairs and painting. The fifth change was to extend the period of performance to 9 September 2005. The contract value was \$4,978,988 and increased to \$5,044,988.30, increasing the overall total value of the contract by \$66,000.30.
- Modification # P00006, dated 21 September 2005, provided clarification to Mod #P00004. The total contract value remains unchanged at \$5,044,988.30. However, \$44,280 was de-obligated from item T-16 general wall repairs and painting. The "deobligation" did not reduce money from the overall contract; however, the money was moved from one subtask to another subtask deemed more critical.

### **Project Objective**

Based on the contract statement of work (SOW), this project is for the renovation of facilities at the Basrah International Airport (BIA), Basrah, Iraq. Renovation locations included the air traffic control (ATC) tower, airport terminals, plant/administration building (plant facility), fire station and their supporting facilities. The stated general objective was *"the renovation and repairs will bring these facilities up to an acceptable level of comfort, safety, and functionality."*

### **Description of the Facility (preconstruction)**

The description of the facility (preconstruction) and previous applicable projects were based on information obtained from the contract and the USACE project files. The Basrah International Airport (BIA) was an existing airport located outside of the City of Basrah in southern Iraq. The BIA is one of three major airports in Iraq. A USACE information brief dated 22 February 2005 included the following background information pertaining to the airport:

*"The Basrah International Airport (BIA) complex was designed and built by German company over a long period beginning in 1981 and ending seven years later. From July to September 1987, the commissioning was executed. The hand-over process took place from September 1987 to August 1988. Although Iraq Airways conducted the first flight from BIA on 8 August 1988, the airport has never been fully operational. Wars,*

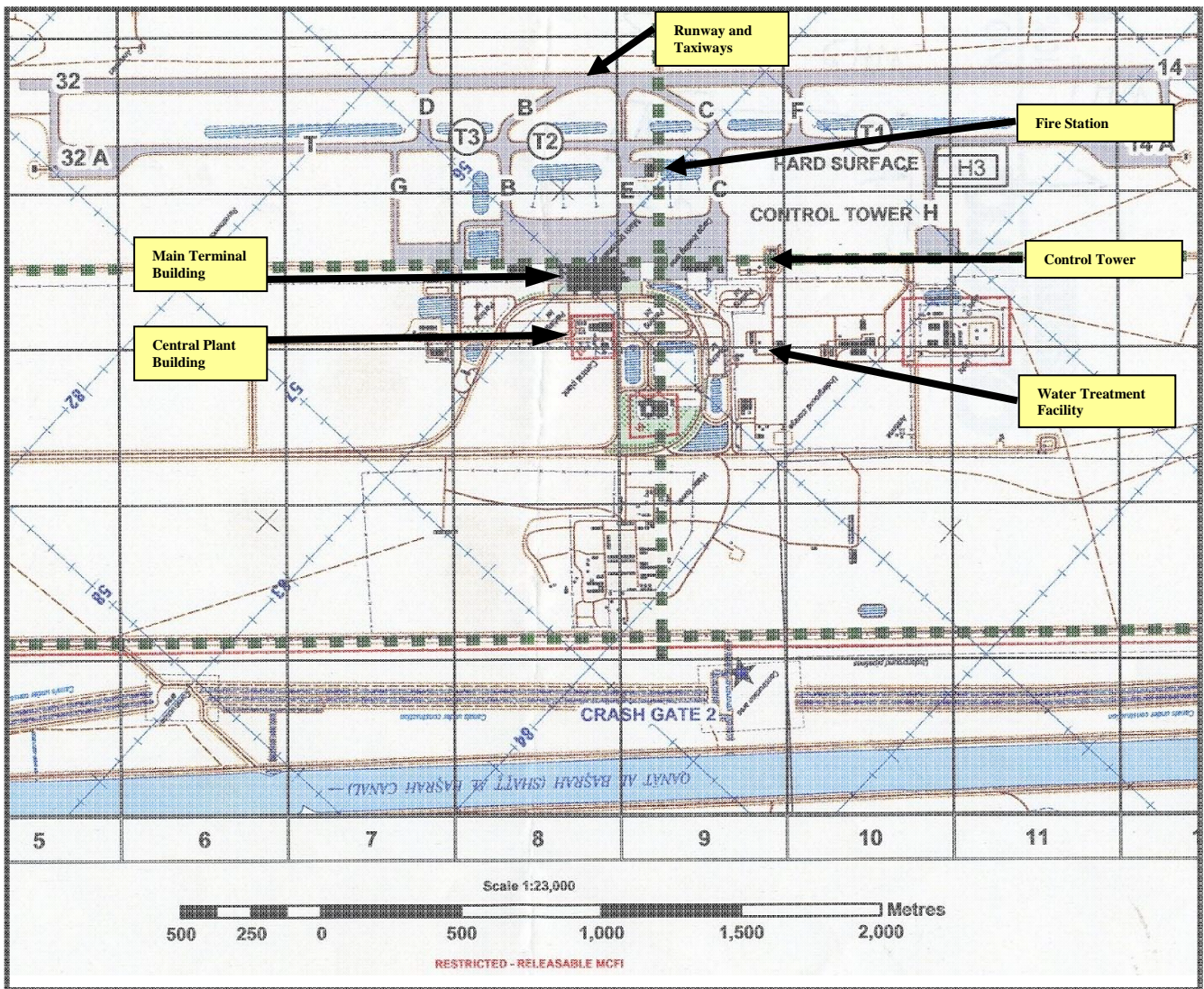
*sanctions, and embargos against Iraq have all prevented BIA from achieving its full potential. At full capacity, BIA was designed to handle three million people per year.”*

Additionally, the contract SOW stated:

*“Currently, the Basrah air traffic control (ATC) tower, airport terminals, Central Plant/administrative building, fire station and their supporting facilities are below the standards necessary to provide a safe and healthy environment for the traveling public and airport operations personnel. These facilities have suffered from neglect, looting, and a general lack of maintenance leaving them in various degrees of acceptable level of comfort, safety, and functionality.”*

#### General Layout

The BIA facility operating area is approximately 4 kilometers (km) by 2 km in size. The complex includes one runway, taxiways, two terminal buildings, central plant and administration facility, control tower, fire station, water treatment and storage facility, and fuel farm, as well as additional structures. Additionally, there are water distribution and sanitary sewer distribution systems, electrical production and distribution systems, electrical generation and distribution systems, and heating ventilation and air conditioning systems (HVAC) associated with the facilities. Figure 1 shows the general layout of BIA. Site Photo 1 shows the front exterior of the main passenger and Site Photo 2 shows the runway and taxiway areas.



**Figure 1. General layout of Basrah International Airport facility**



**Site Photo 1. Front exterior view of main passenger terminal**



**Site Photo 2. View of runway and taxiway**

### Water System

Water is supplied to above ground storage tanks at BIA from the sweet water canal via a pumping station and pipelines. BIA had an existing water treatment facility (original capacity of 220 cubic meters per hour ( $\text{m}^3/\text{h}$ )), which included clarification dosed with aluminum sulfate (alum) followed by filtration and chemical disinfection by chlorination. Dosing by alum, ferric chloride, phosphate, and soda takes place at various stages of treatment to achieve water conditioning and pH control. Treated water then passes through Reverse Osmosis (RO) filters before it is pumped into the supply distribution system and “process” water system. There is a separate fire suppression system which includes electric and diesel operated pumps and



distribution system. The HVAC and boiler units require processed water dosed with sulfuric acid to produce the required pH level. The processed water system includes acid storage tanks, mixing tanks, and distribution system for water used in the HVAC and boiler systems.

A 2003 contract between the U.S. Agency for International Development and Bechtel was awarded to include refurbishment of existing water process treatment and pumping facilities at BIA to full functional operational capacity by means of installing new, and carrying out refurbishment of existing system, equipment, and components with contractor and subcontractor supplied materials. Additionally, British forces installed a portable Reverse Osmosis system at BIA which generates their potable water requirements.

Site Photo 3 shows the exterior of the water treatment facility and Site Photo 4 shows the Reverse Osmosis filters located inside the water treatment facility.



**Site Photo 3. Exterior view of water treatment facility**



**Site Photo 4. Reverse Osmosis filters**

### Sanitary Sewer System

Sewage is collected from airport facilities and pumped off site for treatment. The BIA facilities sanitary sewer system is composed of bathroom facilities, collection pipes, lift stations, pumps, and transmission pipelines.

### Electrical

Based on information from the contract files, the BIA electrical system is serviced through two-33 kilovolt (kV) (transmission voltage) feeder lines and three on-site generators. The feeder lines transmit power to switchgears and step-down transformers, which convert the electricity from 33 kV to 11 kV. The three on-site generators were designed to produce 3 megavolt-amperes (MVA) at a voltage of 11 kV. The 11 kV electricity, referred to as medium voltage (MV) is distributed through three distribution circuits and are referred to as MV-1, MV-2, and MV-3. The distribution circuits transmit the 11kV electricity to secondary transformers located at individual facilities within the airport.

A preliminary assessment of the main 3 MVA and individual facility located generators was completed by Bechtel International Systems, Inc./USA (report signed

16 January 2004). The objective for the project was to define the scope and costs of future construction activities required to provide reliable power to the medium voltage (MV) electrical network, special equipment to be installed during upcoming aviation projects, and other critical aviation infrastructure at BIA.

### HVAC Systems

Each of the primary facilities identified for renovation in the contract are designed with its own HVAC units. Each HVAC units includes chillers, condensers, cooling towers, controls, and air handling units. The HVAC units and boiler units use processed water generated at the water treatment facility and distributed throughout the BIA.

The passenger terminal main HVAC systems are located at the plant facility, adjacent to the terminal building. Three large 1700 ton capacity pneumatically controlled chiller units and two boiler units located within the plant facility and six cooling towers (three sets of two) are located next to the facility. The fire station had (2) five ton HVAC units and the air traffic control tower had a single 116 ton HVAC unit. A “comprehensive exploratory inspection” was conducted by Carrier Hexacorp in January 2004 as a subcontract to Bechtel under contract with the U.S. Agency for International Development (U.S. AID).

The report summarized the condition of the HVAC units at select BIA facilities, and included a bill of materials and cost estimates to repair or replace the units. Honeywell and M+W Zander, both as subcontractors to Bechtel under contract with U.S. AID, completed assessments of the HVAC controls and air handling units/extraction fans and/or exhaust fans, respectively, in January 2004. Summary reports included existing conditions and recommendations for repair or replacement of the units.

Site Photo 5 shows one of the three chiller units located inside the plant facility and Site Photo 6 shows the three pairs of cooling towers located adjacent to the plant facility.



**Site Photo 5. Chiller unit inside plant facility**



**Site Photo 6. Three pairs of the cooling towers located adjacent to the plant facility**

## **Scope of Work of the Contract**

Based on the contract's original SOW and subsequent contract modifications, the major tasks associated with the renovation of BIA included cleaning, repair and/or replacement of water, sewer, HVAC, mechanical, architectural, and electrical systems at the BIA passenger terminal, ATC, fire station, and plant facility. Approximately 58% of the total contract amount involved the repair, renovation, and/or repair of the HVAC, elevator, escalator, and baggage conveyor system as well as installation of a generator unit. Due to the extent of this project, those systems will be the primary focus of this assessment. General contract requirements per facility are as follows:

### **Passenger Terminal**

- Repair and recertify three elevators and three escalators
- Conduct outgoing baggage conveyor repairs
- Repair (10) domestic travel ticket counters, baggage scales, and conveyors
- Repair (2) baggage claim conveyors in the south baggage claim area
- Replace and re-lay granite tile in the lobby
- General cleaning and painting of specified locations
- Repair/replace electrical lighting on 1<sup>st</sup> and 2<sup>nd</sup> floor
- Clean sanitary sewers and storm drains
- Check domestic water system and repair/replace valves and fixtures

### **Air Traffic Control Tower**

- Clean interior
- Cleanout sanitary sewer lines
- Clean and check chilled water supply and return
- Check and repair electrical supply, power, and lights
- HVAC System
  - Remove defective cooling towers
  - Supply and install new cooling tower
  - Supply and install compressors
  - Supply, install, and functionally check chiller control panels
  - Clean, test, calibrate, balance, and commission the renovated HVAC system
  - Renovate air-handling units

### **Road Access**

All requirements for road access repairs were deleted in Contract Modification 2.

### **Fire Station**

- Clean and repair sanitary sewer lines
- Clean and repair water supply – potable
- Remove and replace five roll-up doors
- Clean and repair electrical supply
- Provide 100 kilowatt-ampere (kVA) generator set
- HVAC System
  - Remove defective cooling towers
  - Supply and install new cooling tower
  - Supply and install compressors
  - Supply, install, and functionally check chiller control panels
  - Clean, test, calibrate, balance, and commission the renovated HVAC system
  - Renovate air handling units

#### Plant Facility

- Overhaul and warranty of (3)1700 ton chillers
- Repair and maintenance of (6) cooling towers
- Inspection, maintenance, and calibration of all primary/secondary chilled water and condenser systems and pumps
- Supply and install new air compressors and associated equipment
- Functionally check-out, charge, start up and commission chemical dosing system
- Inspect, maintain, and commission operable boiler unit

#### Current Project Design and Specifications

This project was primarily renovation of facilities and did not include new construction. Therefore, the contract did not require design submittals. The contract required repair, renovation, and rehabilitation plans. The contract stated that specifications shall include required quality control and that all testing be conducted by the contractor, its subcontractors, vendors, and/or suppliers. Additionally, the contractor may propose equipment, material, and work that meets the intent of the publications listed here, provided documented justification required for such alternates are submitted and approved by the Sector Project and Contracting Office. The standards to be used are:

- American Standards of Testing Materials and the specifications of the British Standard
- International Building Code
- International Plumbing Code
- International Mechanical Code
- Sheet Metal and Air Conditioning Contractors National Association
- National Electric Code, International Electric Code, or British Standard (B.S. 7671)
- American Association of State Highway and Transportation Officials publication

The contractor submitted potable water, sanitary sewer, architectural, mechanical, and HVAC work plans to USACE GRS. USACE GRS completed a technical review and commented on the work plans and the contractor re-submitted the revised work plans.

The potable water work plans included individual work plans for the ATC tower, passenger terminal, fire station, and plant facility. The plans included details regarding isolation of the potable water systems, hydrostatic testing, purging and chlorination of the systems, commissioning, and a list of basic tools required. The sanitary sewer work plan included details regarding the on-site evaluation, repairs, specialized cleaning, commissioning, and list of tools. The architectural work plan included individual work plans for the ATC tower, passenger terminal, fire station, plant facility, outlined cleaning procedures and a list of tools required. The HVAC work plan included a list of the major phases of HVAC work which were to be completed, as well as the subcontractor's scope of work for the HVAC upgrades and repairs. The mechanical work plan included a general description of work to be completed on the baggage conveyors, escalators, and elevators.

Based on a review of the work plans, review process, and submittals, the plans appear complete and detailed enough to complete the requirement of the contract. The exception to this was the mechanical work plans that included baggage conveyor, escalator, and elevator repairs, which lacked sufficient details on how the work was to be performed.



## Site Assessment

Between 21 and 26 February 2006, we performed an on-site assessment of the Basrah International Airport Terminal and Tower renovation project. The on-site assessment included a visual check of the passenger terminal, ATC tower, fire station, and plant facility. In addition, the assessment team visited the water treatment plant because the Basrah International Airport's potable water and heating, ventilation and air conditioning systems processed water is generated at the water treatment plant. Processed water is a critical requirement for the operation of the heating, ventilation and air conditioning equipment. At the time of the assessment, the project was listed in the PCO database as 85% complete. Renovation work was reported complete at the time of the assessment and the contractor was not on site. The United States Army Corps of Engineers Resident Engineer, Project Engineer, and Quality Assurance Representative were available during the assessment, as well as representatives from the airport and the Iraq Reconstruction Management Office.

During the 21 February 2006 site visit, electrical power to the Basrah International Airport was disrupted and power was not available at the airport terminal. Power was available during subsequent site visits made by the assessment team. Due to the numerous items identified in the SOW, only select work activities were evaluated as identified in the previous "Scope of Work of the Contract" section of this report.

### **Work Completed**

#### **Passenger Terminal**

A walkthrough of the passenger terminal was conducted to determine its general condition. The passenger terminal lobby, ticket counters, waiting area, baggage claim, elevators, escalators, and administrative areas, were visited. Overall, the areas appeared clean and operational. Site Photo 7 shows the lobby of the passenger terminal and Site Photo 8 shows the passenger waiting areas.



**Site Photo 7. Passenger terminal lobby**



**Site Photo 8. Passenger terminal waiting area**

The contract required the repair of three elevators, three escalators, and the baggage conveyor systems. Two of the elevators and all three of the escalators to be repaired were located at the passenger terminal. The third elevator was located at the ATC building. The contract did not include detailed requirements for the repairs, although it did require a detailed plan that was to specify precisely how the contractor proposed to perform the work. The mechanical work plan submitted by the contractor stated that the elevator work would include inspection and realignment of the elevator guide rails, inspection and replacement as needed of elevator cables, inspection and reset of floor stop switches, and inspection and replacement (as needed) of motor mounts. The escalator work included inspection and re-lubrication of all stair rollers, inspection of handrail guides and adjustment as necessary. Both the elevators and escalators were to be completed and certified by subcontractors that have been reviewed by the Contracting Office Representative and BIA.

One elevator and one escalator were visited during the site assessment. Both were observed to be operational. Site Photo 9 shows one of the escalators and two elevators. The contractor certified the work that was completed, although the contractor did not certify the complete operation of the elevators.

The baggage claim conveyors were located in an area which required cleaning and painting. The baggage claim conveyors appeared to be clean and functional, although the operation was not verified during the assessment. Site Photo 10 shows the condition of the baggage claim area during the assessment.



**Site Photo 9. Escalator and two elevators (left) at passenger terminal**



**Site Photo 10. Baggage claim area with conveyors**

The contract and modification required the repair of ten domestic travel ticket counters, baggage scales, and conveyors. The domestic travel ticket counter area was observed during the assessment and appeared to be recently renovated. All lights were operational, the flooring was clean, and the ticket counter areas were well cleaned and appeared operational. Site Photo 11 shows the ticket counter area located inside the airport passenger terminal.



**Site Photo 11. Passenger terminal ticketing area**

The contract required the repair or replacement of electrical lighting on the 1<sup>st</sup> and 2<sup>nd</sup> floor of the passenger terminal. Ceiling lights in the ticketing area as well as the 1<sup>st</sup> and 2<sup>nd</sup> floor administrative area were observed to be operational at the time of the site visit. Site Photo 12 shows the operational lighting in the ticketing area of the passenger terminal.



**Site Photo 12. Operational lighting in ticket area of passenger terminal**

### Air Traffic Control Tower

The contract required the removal of existing cooling towers and the supply and installation of new cooling towers, compressors, and chiller control panels. At the time of the assessment, one Baltimore Air Coil unit was observed installed on the roof of the tower administration building, located adjacent to the ATC. The unit was listed as model number VXI-50-3 with serial numbers H05-0950. The electrical



controls and piping appeared to complete. This unit was a direct replacement (same model number) of the previous existing cooling tower.

The original “defective” cooling towers were not observed on site. The ATC HVAC system was not operating at the time of the site assessment because processed water required for operation was not available. The USACE QAR stated the system requires pH balanced “processed” water generated at the BIA water treatment facility. The water treatment facility was not operational and was not producing and supplying the required processed water. The processed water system was temporarily activated in order to produce and supply processed water for the testing and commissioning of the HVAC units.

Site Photo 13 shows the Air Traffic control tower and Site Photo 14 shows the cooling tower mounted on the roof of the ATC administration building



**Site Photo 13. Air Traffic Control tower (Courtesy of USACE)**



**Site Photo 14. Roof mounted cooling tower located at ATC administration building**

## Fire Station

The contract required the procurement and installation of a 100 kVA generator set for backup electricity requirements of the fire station. At the time of the assessment, a 150 kVA, Model XP150E generator set was installed and connected through an electrical switch panel to the fire station. The factory data plate listed the serial number as FGWPEP05VCOAO4214 and year of manufacture as 2005.

In addition, the contract required the removal of existing cooling towers and the supply and installation of new cooling towers, compressors, and chiller control panels. At the time of the assessment, two Baltimore Air Coil units were observed installed behind the fire station, mounted on existing concrete mounts. The two units were listed as model number VXI-18-2X with serial numbers H05-0948 and H05-0949.

The electrical controls and piping appeared to complete. The units were a direct replacement (same model number) as the previous existing cooling towers. The original “defective” cooling towers were not observed on site. The fire station HVAC system was not operating at the time of the site assessment because processed water required for operation was not available. As with the HVAC system at the ATC, the USACE QAR stated the system requires pH balanced “processed” water generated at the BIA water treatment facility. The water treatment facility was not operational and was not producing and supplying the required processed water. The processed water system was temporarily activated in order to produce and supply processed water for the testing and commissioning of the HVAC units.

Site Photo 15 shows the exterior front of the fire station and Site Photo 16 shows the exterior shell of the generator set. Site Photo 17 shows the exterior located HVAC cooling towers.



**Site Photo 15. Exterior front of fire station (Courtesy of USACE)**



**Site Photo 16. Generator set located at the fire station**



**Site Photo 17. HVAC cooling towers located at fire station**

### Administration and Plant Facility

The contract required the overhaul and warranty of three-1700 ton chiller and six cooling towers, inspection, maintenance, and calibration of all primary/secondary chilled water and condenser systems and pumps, supply and installation of new air compressors, and inspection, maintenance, and commission of one boiler unit. Review of USACE project documents show the systems were renovated and commissioned 23 August 2005 and the turnover document signed 22 May 2006. During the site assessment, all systems were observed intact and appeared that maintenance activities were not on-going. New compressor pumps were observed installed in the plant facility.

Operation of the chillers, cooling towers, pumps, compressors, and boiler units could not be verified during the site visit because processed water required for operation was not available. The USACE QAR stated the system requires pH balanced “processed” water generated at the BIA water treatment facility. The water treatment facility was not operational and was not producing and supplying the required processed water. The processed water system was temporarily activated in order to produce and supply processed water for the testing and commissioning of the HVAC units. In addition, the boiler unit operates on diesel fuel. The fuel tanks are located adjacent to the plant facility, but it was reported that the fuel pumps were not operational.

Site Photo 18 shows the air compressor units and Site Photo 19 shows the boiler units.



**Site Photo 18. Air compressor units located at plant facility**



**Site Photo 19. Boiler units located at plant facility**



## Water Treatment Facility

The water treatment facility was not included in the BIA renovation project. A 2004 U.S. AID project was awarded to “include refurbishment of existing process treatment and pumping facilities at BIA to full functional operational capacity by means of installing new and carrying out refurbishment of existing system, equipment and components with contractor and subcontractor supplied materials.” Processed water required for operation of the HVAC systems through the airport, as well as potable water for the passenger terminal are produced at the water treatment plant. The assessment team visited the water treatment plant during the site assessment. The USACE QAR stated that the water treatment plant was not operational and identified numerous pumps and systems with operational issues. Of particular note, alum was observed clogging outlets of the RO filter systems. In a properly operating treatment facility, alum, used for settling of fine particulates, is settled out during the initial phases of treatment. The RO filters are the end of the treatment process and no alum should be present. Although a complete assessment of the water treatment plant was not conducted, it was obvious that the plant was not in operational status. It was unclear if the problems with the water treatment plant were due to equipment malfunction or incorrect operation of the facility.

## Work in Progress

At the time of our site visit, the majority of work had been completed and no work was in progress.

## Work Pending

The contract required follow-on scheduled maintenance for the HVAC systems at the airport facility. At the time of the assessment, the HVAC systems were not operational due to the lack of processed water from the water treatment facility. This will impact the ability to perform scheduled maintenance on the HVAC equipment.

# **Project Quality Management**

## Contractor’s Quality Control Program

The contractor submitted a quality management plan that contained the required organization chart, security plan, safety plan, and quality control (QC) plan. The quality management plan addressed the QC organization, inspections, nonconforming items, testing and test plans, submittal procedures, reports and records, material handling and storage. We determined the contractor’s quality management plan met the standards addressed in Engineering Regulation 1180-1-6 (*Construction Quality Management*) or PCO Standard Operating Procedure CN-103 (*Contractor Construction Quality Control Plan*).

The contractor submitted daily QC reports, which were reviewed by the USACE Project Engineer and the Quality Assurance Representative (QAR). These reports contained information such as work accomplished each day with the location, activity and by whom, test results, deficiencies and corrective actions, labor distribution, equipment utilized, and material received on site. In addition, the contractor prepared daily inspection checklists for each definable feature that was scheduled to be worked on each day. The contractor did not maintain deficiency logs to document problems noted with construction/renovation activities. However, the

QC reports did mention reoccurring problems that the contractor was experiencing on site.

### **Government Quality Assurance**

USACE Engineering Regulation (ER) 1110-1-12 and Project and Contracting Office Standard Operating Procedure CN-100 specify requirements for a Government Quality Assurance (QA) program. The USACE QA program was adequate. The USACE QARs were on site daily during reconstruction events. USACE QAR monitored field activities and completed QA reports, which were forwarded to the USACE Resident Engineer for review and verification of progress completed for payment approval. In addition, the QAR reports were complete. Furthermore, the QAR included project specific or detailed photographs. USACE QARs did not maintain QA deficiency logs. However, the daily presence of the QAR and the other procedures in-place ensured that potential construction deficiencies were detected, evaluated, and properly corrected, if necessary, in a timely manner.

### **Project Sustainability**

The contract specifications required the contractor to provide and certify warranties in the name of the airport authority, for all equipment, which includes any mechanical, electrical and/or electronic devices, and all operations for 12 months after issuance of the Taking-Over-Certificate. The contractor was to provide any other commonly offered extended warranties for equipment and machinery purchased. The contract required the contractor to provide training to the Iraqi workforce on the operations and maintenance of all infrastructure communication components.

Although the contract included recurring maintenance of the HVAC systems, the maintenance can not be completed because “processed water” from the water treatment facility was not available. This issue was addressed in the “Site Assessment” section of this report.

### **Conclusions.**

Based upon the results of our site visit, we reached the following conclusions for assessment objectives 1, 2, 3, 4, and 5. Appendix A provides details pertaining to Scope and Methodology.

#### **1. Determine whether project results are consistent with original objectives.**

The stated objective of the Basrah Terminal Renovation Project was “*the renovation and repairs will bring these facilities up to an acceptable level of comfort, safety, and functionality.*” Renovation locations included the air traffic control tower, airport terminals, plant facility, fire station and their supporting facilities.

Although the individual tasks of the project appear to be complete, the objective of this project has not been achieved. The water treatment facility, which generates the required processed water for the HVAC systems as well as the potable water supply for the airport was not operational at the time of the assessment. Although USACE documentation identified that “*poor quality processed water places \$2.5 M of chiller work in jeopardy*” in a 10 April 05 Airport Status Meeting presentation, no budgeted project to repair the water treatment facility existed at the time of the assessment.

2. Determine whether project components were adequately designed prior to construction or installation.

This project was primarily renovation of facilities and did not include any new construction. The contract did not require design submittals, although repair, renovation, and rehabilitation plans were required. The contractor submitted potable water, sanitary sewer, architectural, mechanical, and HVAC work plans to the USACE GRS. USACE GRS completed a technical review and commented on the work plans and the contractor re-submitted revised work plans. The work plans appeared adequate to complete the required renovation work. This occurred because USACE reviewed, commented, and approved the plans, thus ensuring they were consistent with contract requirements.

3. Determine whether construction met the standards of the design.

All work observed appeared to be consistent with the contract requirements. This occurred in part because the USACE Resident Engineer and USACE QAR effectively monitored and supervised the renovation efforts of the contractor. USACE offices were located adjacent to the airport facility and the USACE QAR was at the project site daily, which was instrumental in managing this large and varied project.

4. Determine whether the Contractor's Quality Control plan and the Government Quality Assurance Program were adequate.

The contractor submitted a quality management plan that contained the required organization chart, security plan, safety plan, and quality control (QC) plan. We determined the contractor's quality management plan met the standards addressed in Engineering Regulation 1180-1-6 (*Construction Quality Management*) or PCO Standard Operating Procedure CN-103 (*Contractor Construction Quality Control Plan*). The contractor submitted daily QC reports which were reviewed by the USACE Project Engineer and the Quality Assurance Representative (QAR). These reports contained information such as work accomplished each day with the location, activity and by whom, test results, deficiencies and corrective actions, labor distribution, equipment utilized, and material received on site. The contractor did not maintain deficiency logs to document problems noted with construction/renovation activities.

The USACE Engineering Regulation (ER) 1110-1-12 and PCO Standard Operating Procedure CN-100 specify requirements for a Government Quality Assurance program. Overall, the QA program was adequate. The QAR was on site on a regular basis during construction, and monitored field activities, and submitted QA reports. A deficiency log was not maintained, but deficiencies were minimal. In addition, the QA reports included detailed photographs.

5. Determine if project sustainability was addressed.

Sustainability was addressed. The contract specifications required the contractor to provide and certify warranties in the name of the airport authority, for all equipment, which includes any mechanical, electrical and/or electronic devices, and all operations for 12 months after issuance of the Taking-Over-Certificate. The contractor was to provide any other commonly offered extended warranties for equipment and machinery purchased. The contract required the contractor to provide training to the Iraqi workforce on the operations and maintenance of all infrastructure communication components.

## **Recommendations.**

The Commanding General of the Gulf Region Division/Project and Contracting Office and the Iraq Reconstruction Management Office should coordinate on other Basrah International Airport renovation projects. In addition, the Commanding General of the Gulf Region Division/Project and Contracting Office and the Iraq Reconstruction Management Office should require:

A comprehensive and coordinated effort to include scope and funding requirements and funding requests to ensure that the Basrah International Airport has a functioning water treatment facility to provide potable water for the passenger terminal and to provide processed water, which is required for the heating, ventilation, and air conditioning systems, if the original objectives of the contract are still valid.

## **Management Comments.**

The Commander, Gulf Region Division (GRD), of the U.S. Army Corps of Engineers and the Director, Iraq Reconstruction Management Office (IRMO) provided comments to the draft report. The Commander GRD did not concur with the recommendation, although he agrees with the intent of the recommendation and recommended that it should be directed to (IRMO). IRMO agreed that a properly operating water treatment plant is required to support equipment repairs and make the buildings habitable at Basrah International Airport (restroom, HVAC, water and health). IRMO stated that a detailed solicitation to repair the Water Treatment Plant was completed, although funding is currently not available. Additionally, water plant repairs are an IRMO Transportation priority in FY2007, if funding becomes available. IRMO noted that this issue is quite critical as the use of untreated water in the chillers will damage sensitive equipment.

## **Evaluation of Management Comments.**

The management comments addressed the issues raised in our report and the actions taken and planned should correct the issues identified, pending funding of the repair of the Basrah Airport water treatment project.

## **Appendix A. Scope and Methodology**

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We performed this project assessment from February through June 2006, in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer and an auditor. In performing this Project Assessment we:

- Reviewed contract documentation to include the following: Contract, Task Order, Task Order Modifications, Contract documentation, and Statement of Work;
- Reviewed the design package (drawings and specifications), Quality Control Plan, Contractor's Quality Control Reports, Testing and/or Closeout documents, and Quality Assurance Reports;
- Interviewed the United States Army Corps of Engineers Resident Engineer, Quality Assurance Representative, and the Iraq Reconstruction Management Office Regional Aviation Consultant; and
- Conducted an on-site assessment between 21-26 February 2006, and documented results at the Basrah International Airport Terminal and Tower Renovation project in Basrah, Iraq.

## Appendix B. Acronyms

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ATC	Air Traffic Control
BIA	Basrah International Airport
CQC	Contractor Quality Control
GRS	Gulf Region South
HVAC	Heating, Ventilation, and Air Conditioning
kV	Kilovolt
kVA	Kilovolt-ampere
km	kilometer
M <sup>3</sup> /hr	cubic meters per hour
MVA	Megavolt-ampere
QA	Quality Assurance
QAR	Quality Assurance Representative
SOW	Statement of Work
USACE	United States Army Corps of Engineers

## **Appendix C. Report Distribution**

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### **Department of State**

Secretary of State

Senior Advisor to the Secretary and Coordinator for Iraq

U.S. Ambassador to Iraq

Director, Iraq Reconstruction Management Office

Inspector General, Department of State

### **Department of Defense**

Deputy Secretary of Defense

Director, Defense Reconstruction Support Office

Under Secretary of Defense (Comptroller)/Chief Financial Officer

Deputy Chief Financial Officer

Deputy Comptroller (Program/Budget)

Inspector General, Department of Defense

### **Department of the Army**

Assistant Secretary of the Army for Acquisition, Logistics, and Technology

Principal Deputy to the Assistant Secretary of the Army for Acquisition,  
Logistics, and Technology

Deputy Assistant Secretary of the Army (Policy and Procurement)

Director, Project and Contracting Office

Commanding General, Joint Contracting Command – Iraq/Afghanistan

Commander, Gulf Region Division, U.S. Army Corps of Engineers

Assistant Secretary of the Army for Financial Management and Comptroller

Auditor General of the Army

### **U.S. Central Command**

Commanding General, Multi-National Force - Iraq

Commanding General, Multi-National Corps – Iraq

Commanding General, Multi-National Security Transition Command – Iraq

Commander, Joint Area Support Group – Central

### **Other Defense Organizations**

Director, Defense Contract Audit Agency

## **Other Federal Government Organizations**

Director, Office of Management and Budget  
Comptroller General of the United States  
Inspector General, Department of the Treasury  
Inspector General, Department of Commerce  
Inspector General, Health and Human Services  
Inspector General, U.S. Agency for International Development

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    Subcommittee on Defense  
    Subcommittee on Foreign Operations  
Senate Committee on Armed Services  
Senate Committee on Foreign Relations  
    Subcommittee on Near Eastern and South Asian Affairs  
    Subcommittee on International Operations and Terrorism  
Senate Committee on Homeland Security and Governmental Affairs  
    Subcommittee on Government Efficiency and Financial Management  
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House Committee on Armed Services  
House Committee on International Relations  
    Subcommittee on Middle East and Central Asia  
House Committee on Government Reform  
    Subcommittee on Government Efficiency and Financial Management  
    Subcommittee on National Security, Emerging Threats and International Relations



## **Appendix D. Project Assessment Team Members**

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report were:

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